REMARKS

Claims 1, 3, 12 and 37 have been amended to clarify the invention. Non-elected claims 27-36, 39 and 40 have been canceled.

In ¶ 5 of the action, claims 1-4, 10, 12 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over US 5,352,090 to Churchill *et al*. The Applicant traverses this ground of rejection for the following reasons.

Claim 1 has two parts, one involving detectors and one involving a controller that utilizes the detector data. The Churchill patent also involves detectors and processors for the detector data. Almost anything could be reduced to those simple terms, but what matters is the type of information that is being gathered by the detector and what that data is then being used for. The Churchill patent's sensor is measuring things that let it calculate parameters relating to rotor blade "track and balance." If you look at a rotating helicopter rotor edge-on, each blade passes by along a certain line, and that line has to be within a certain up-down tolerance band in order to prevent out-of-balance vibrations. "Track and balance" refers to the process of adjusting each blade to follow the right line as it rotates. The Churchill patent therefore deals with parameters that affect up/down and possibly dynamic weight balancing factors (the latter being like spin-balancing a new tire on a car, again to prevent vibration).

In contrast, the detectors and controller recited in claim 1 are doing something very different. They are working with the rotational (polar) position of each blade in a rotor as it spins, not its up/down vertical position as with the Churchill patent. The Churchill sensors and processors are no more relevant to claim 1 than the sensor and processor in an engine tachometer are: rotating things are measured and interpreted, but for totally different reasons. The wording of the second part of claim 1 illustrates this clearly: The detectors detect the rotational positions of each rotor and the controller "adjust[s] the rotational speed" of those rotors and therefore their angular position in the rotor disk. In contrast, those in the Churchill patent are used to detect the vertical position of rotor blades for completely different reasons. One object of the instant invention is to avoid blade-to-blade collisions between front and rear rotor disks, while the Churchill patent is focused on reducing vibrations in a rotor. Someone reading the Churchill patent would not gain any insight into problems beyond that. Nor is a Churchill-type acoustic sensor integral to the success of the system recited in Applicant's claim 1: any sensor would do, using light, infrared, ultraviolet, radar, or any other detectable source.

With regard to rejected claim 2, the Churchill sensor does not directly sense the presence of a rotor blade, but rather it senses the downward pressure field created by that blade. Because downward-thrust air from an airfoil like a rotor blade always trails the blade itself, the blade has already passed by the time the Churchill sensor detects anything. The magnitude of that mismatch between blade position and the downward airflow produced by the blade depends on many factors including blade velocity, aircraft forward velocity, ambient wind velocity (especially at low aircraft speeds), interactions with the aircraft's fuselage (boundary layers etc), blade coefficient of lift, and blade coefficient of drag. These vary dynamically from moment to moment, so that the actual blade position is difficult if not impossible to know in real-time from the information collected by the Churchill sensor. Other types of sensors such as infrared or ultraviolet, specifically mentioned in Applicant's claims 6 through 9, are virtually unaffected by these factors, but they would be unusable in the Churchill system's design. This shows the fundamental difference between the two systems. A Churchill sensor would provide an inferior implementation of the instant invention, if it worked at all, and Applicant's preferred sensors would not work at all in the Churchill system. As for the controller, its function as

mentioned above is to compute and allow control of the rotational positions of the rotor blades around the disk circle, to avoid collisions between the blades of the front rotor and those of the rear rotor. The Churchill patent's electronics are concerned with the up-and-down position of the blades, not the angular round-and-round positions.

Claim 3 is not unpatentable in view of Churchill for the same reasons, set forth above, that claim 1 is not unpatentable.

Claim 10 recites emitters that produce signals that are detected by the sensors, either mounted on the fuselage or the rotor blades. In the Churchill patent there are no emitters, and nothing in its use of pressure-sensitive detectors would lead one to extrapolate that emitters would be of any value. In fact their use would be impossible with the Churchill system since they would interfere with the reception of pure pressure pulses caused by the rotor blades, which is the vital source of data by which the system computes and interprets blade lift. The existence and utility of emitters is neither disclosed nor suggested in the Churchill patent.

With regard to claim 13, the function of the detector/controller system here is to monitor and control the angular position of the rotor blades, not their vertical position, and they must be able to "know" the angular positions with a

greater degree of precision than is possible with the Churchill system -- see discussion above.

In view of the foregoing, the Applicant respectfully submits that the rejection of claims 1-4, 10, 12 and 13 as being unpatentable over Churchill should be withdrawn.

In ¶ 11 of the action, claims 1-4, 10, 12 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Churchill in view of Skutecki (US 4,628,455). The Applicant traverses this ground of rejection for the following reasons.

As previously discussed, Churchill does not disclose detecting the rotational positions of the rotors. Nor does Skutecki. To the extent that Skutecki teaches adjusting the rotor speeds, it is in the context of limiting the engine torque in response to data output from engine torque sensor 50 (see Figure 1). Thus there is no basis for asserting that the rejected claims are unpatentable over the combination of Churchill and Skutecki. Skutecki does not disclose or suggest what is missing from Churchill.

In ¶ 17 of the action, claims 1-6, 8, 10-13, and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Frank (US 3,515,485) in view of Churchill and Skutecki. The Applicant traverses this ground of rejection for the following reasons.

In support of the rejection, the Examiner concedes that Frank does not teach detectors for detecting the rotational positions of the rotors. Like Churchill, Frank only detects the vertical displacement of the rotor blade tips. Since neither Churchill not Skutecki, as discussed above, disclose such detectors, it should be apparent that the combination of Churchill and Skutecki with Frank does not provide the type of detectors recited in Applicant's independent claims 1 and 3 that is missing from Frank. Nor do any of these references disclose or suggest adjusting the rotational speed of a rotor in response to signals output from rotor rotational position detectors.

In ¶ 25 of the action, claims 7 and 9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Frank in view of Churchill and Skutecki as applied to claim 3, and further in view of Engels *et al.* (US 5,205,710). The Applicant traverses this ground of rejection for the same reasons, set forth above, that claim 3 is not unpatentable in view of Frank in combination with Churchill and Skutecki.

In ¶ 27 of the action, claims 3, 18-25, 37 and 38 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bass *et* al. (US 6,789,764) in view of Frank, Churchill and Skutecki. The Applicant traverses this ground of rejection for the following reasons.

In support of the rejection, the Examiner concedes that Bass does not teach detectors for detecting the rotational positions of the rotors. Since none of the Frank, Churchill and Skutecki references, as discussed above, disclose such detectors, it should be apparent that the combination of Frank, Churchill and Skutecki with Bass does not provide the type of detectors recited in Applicant's independent claims 3 and 37 that is missing from Bass. Nor do any of these references disclose or suggest adjusting the rotational speed of a rotor in response to signals output from rotor rotational position detectors.

In view of the foregoing, the Applicant submits that this application is now in condition for allowance. Reconsideration of the application and allowance of claims 1-13, 18-26, 37 and 38 are hereby requested. Upon the allowance of claim 3, the Applicant submits that withdrawn claims 14-17, which depend from claim 3, should also be allowed.

Respectfully submitted,

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